# THE TREATMENT OF FEBRILE CONDITIONS.[1]

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It is one of the most hopeful features of modern therapy that it is taking cognizance of the fact that the organism has been perfecting means of defense since first it became the seat of disease and that these means of defense are to be read not merely in the subtile elaboration of antitoxic bodies in the tissues and the marshalling of counter-forces in the blood elements, but also in the alteration of the functions of organs. Emesis as a symptom is primarily an effort to unburden the stomach of deleterious substances; diarrhea is protective in the same sense; cough removes secretions which are both irritants and mechanical impediments to the respiration; pain ensures rest to an affected part and so on. Interference with these symptoms must be undertaken with discretion lest it become pernicious. It is the knowledge of when to let alone and when to interfere that constitutes the art of therapy. Emesis, diarrhea and cough may become a source of exhaustion; pain which has pointed the way to the trouble and hinted the need of rest be illy borne when continued and fever arise to degrees that are incompatible with its purpose and constitute hyperpyrexia. At this point, treatment steps in to modify and assist, not to disregard Nature's signals.

Fever, as the physician knows it, is almost invariably the result of bacterial action, so cannot be dissociated from toxemia; but pyrexia and toxemia show but little parallelism; indeed, the worst forms of toxemia may be accompanied by no pyrexia at all, while a relatively high temperature may be seen with a minimal toxemia. Briefly, then, unless the degree of temperature is inordinately high, that is, constitutes a hyperpyrexia, the treatment of fever is not an antipyretic treatment but an antitoxemic treatment, and such fall of temperature as accompanies our efforts is incidental to them and not the object at which we aimed.

The treatment of fever,involves the appreciation of certain broad principles that in the main are physiological. They are not numerous, but they are of fundamental importance. We shall take them up seriatim. (1) rest; (2) diet, including the ingestion of water; (3) fresh air; (4) water locally applied, that is hydrotherapy; (5) drugs; (6) hyperpyrexia. I think it little matters what name we give the febrile process or the organism inducing it. The procedures are much the same.

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[1] Read before the Eastern Medical Society, New York City.

REST. It is a valuable form of mental exercise for a physician to pause occasionally and review some of the fundamental facts of physiology that are relevant to the problem in hand. First one should recall the fact that the sum total of the body's activities are but the expression of the conversion of potential energy of the food stuffs into these different forms of energies; that the body observes an accurate balance between the intake and output; that the law of conservation of energy obtains in the human body as well as elsewhere, and, therefore, when the intake is lessened, the expenditure should be diminished and useless forms of work should be avoided that useful purposes may be subserved.

All this means that in fever rest is imperative and that, as the body cells are expending energy in the elaboration of protective substances and the processes of repair are active in inflamed tissues, muscular unrest and muscular work should be avoided. Physiologists tell us that $CO_2$, an end product of the combustion of food stuffs in the production of energy may be taken as a measure of the energy of work and heat arising in the body and that the same man who during sleep eliminates 22 grams of $CO_2$ an hour will, when awake and exercising the greatest amount of muscular relaxation possible, eliminate 31 grams, and under conditions that we ordinarily term rest, such as most patients observe eliminates 38 grams. These figures are cited to call attention to what a relative term "rest" is.

Again, in fever, the vascular and other vital centres are all too often sought out and when we recall the lessened number of heart beats in recumbency and slight fall of pressure under the same circumstances we appreciate the economy exerted in behalf of these organs by rest.

Rest means something more than going to bed, though that is imperative. It means that the bed must be comfortable, so that energy shall not be wasted in the effort to maintain strained positions or avoid uncomfortable ones; it means competent nursing; it means measures directed at sleeplessness and at delirium. Mental rest is equally important, for though the loss of energy in the mental processes *per se* is minute, strained and restless muscles are the results of anxiety and concern, as, indeed, are perverted functions in many organs. Leave the sick room to the sick; exclude solicitous friends. Job's comforters, mourners before the fact. Avoid the introduction of business matters or domestic concerns, and let quiet and order reign. The contrast between a well-ordered, neat, cool, sick-room, and a hot stuffy room with six to ten visitors, gas-jets in full action and Babel and Chaos regnant is one of the most striking that can be witnessed.

DIET. Again let us appeal to physiology for facts. They are (1) That the amount of work done and the amount of heat given off by the human body each day is derived from the food taken in that day or stored in the body from previous meals and that that store is not inexhaustible. (2) That the amount of energy supplied a man at rest each day amounts on the average to 33 calories[2] per kilo of body weight which in a man of average weight amounts to 2300 calories. (3) That a sick man at rest requires as many calories of energy as a well man. (4) That fever makes certain demands in excess of those obtaining in health, because the increased temperature *per se*, that is, pyrexia above 102° F. increases the output some 25 per cent. on an average, thus raising our caloric requirements to 40 per kilo or 3000 for the man of average weight. (5) That the toxins of disease are destructive of body tissue in varying degrees, a destruction which may be overcome or minimized by a sufficient intake of food. (6) That the amount of proteid needed each day in health is about 100 grams. (7) That in fever the requirement is about the same or may be a trifle less, 75 to 85 grams, which is enough to prevent proteid loss when enough carbohydrates are added. The appreciation of these facts is increasingly important in the prolonged fevers, such as typhoid, certain bronchopneumonias or septic conditions.

One other fact is of special importance in orientating us correctly with reference to this subject; namely, that such studies as have been undertaken to determine the efficiency of the processes of digestion and assimilation of the foodstuffs in fever show that except at the onset these processes are scarcely impaired.

A sufficiency of food is an important item in the treatment of fever, because, as has been intimated already, an insufficiency leads to destruction of the body substance with the production of toxic material in the process, an autointoxication.

Briefly, in the beginning of fever, do not push the food; respect the meaning of anorexia; but later increase daily to the approximation of theoretical needs. Remember that there are other foods than milk that are easily digested, including cereals, bread, butter, eggs.

Water is an important item in the treatment of fever; all the water that the patient wants and his wants should be determined by offering him water at frequent intervals, as his cerebral condition may be such as to prevent his asking for the amount he needs.

Studies of the water intake in certain infections such as pneumonia show that the amounts are sometimes extraordinary, 3000 to 5000 c.c. a day, and that the patients who are given a sufficiency seem to do best.

FRESH AIR. That the sick require fresh air would seem a thesis too simple to require emphasis, and yet many physicians make no protest against the vitiation of the sick room by a swarm of visitors and burning gas-jets and make only a half-hearted appeal for an open window.

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[2] A calory is that amount of heat that will raise one kilo of water through 1° C.

The bad effects of ill ventilation are due largely to the accumulation of $CO_2$ gas. In the country pure air contains about 3 volumes of the gas to 10,000 volumes of air. In rooms and work-shops it may rise to over 30 volumes, and in the night with the gas burning to nearly 50.

We consider it niggardly in the hospital if we do not allow 1000 cubic feet to each sick infant, but how many of our patients get 1000 cubic feet of fresh air to themselves in the sick room.

The increase of $CO_2$ is not the only evil in ill ventilation, for contamination of the air with bacteria and varied forms of dirt must ensue; while, heat, moisture, and odors add their depressing effects.

But there is another quality to fresh air when taken in the open that adds materially to its value; it is the element of cold given either by the temperature of the air or by the effects of its movement. Pembrey, in a masterly article on Respiratory Exchange in Hill's *Recent Advances in Physiology and Biochemistry*, says "The success of the open-air treatment depends it would seem, not so much upon any greater purity of the air as upon free exposure; the open air increases the combustion and respiratory exchange improves the appetite and augments the metabolism."

More than that, it is an every-day demonstration to the students in our ward that the exposure of the febrile patient to the open air will induce a rise of blood pressure over that obtained in a well-ventilated ward equal to or better than that obtained from our usual vasomotor stimulants, with the added advantage of being continuously sustained which does not obtain with the drugs.

I am convinced of the very great value of the open air treatment of fever. The pulse and respiration improves, the cerebral intoxication diminishes and the patients are almost universal in their commendation of it.

To reap success, however, the technique must be correct. The patient's bed must be so made as to keep the body always warm, by enclosing the bed in impermeable material like rubber sheeting or paper, the use of the hot water bottle, and by sheltering from winds. The good effects, I believe, come from the action of cold on the nerves of the mucous membrane of the nose or of the face, producing reflexly an improved vascular condition.

WATER LOCALLY APPLIED, HYDROTHERAPY. I am firmly convinced of the efficacy of remedial measures, operating on the various functions through the surface of the body, that branch of the healing art included under the head of physical therapy. This field has been grossly neglected for various reasons; in part because of the dominant position occupied by drug administration in the minds of most practitioners and very largely because of the time and effort entailed in the administration of these measures and the acquisition of a proper technique.

Water is a very valuable instrument in combating the evil results of fever. Baruch, whose persistent advocacy of hydrotherapy constitutes a real service to American Medicine and has not received half the recognition it deserves, points out that the value of water lies not so much in its physical constitution as in the fact that it is an admirable material for the conveyance of heat and cold and that strickly speaking, thermotherapy is a better term than hydrotherapy in the use of water. A few facts should be borne in mind in considering hydrotherapy. (1) That we are aiming rather at the toxemia than at the pyrexia. (2) That the reaction to the use of cold water is the *sine qua non* of success. (3) That friction is as important as the cold in many of the procedures.

The good effects of the cold water are obtained largely through the nervous system. The impulses pouring in through the countless nerves upon the centres result in a slower, stronger heart beat, and an improved vasomotor tone, which can be measured in terms of an increased blood pressure; respiration is deepened, cerebral processes improved, and metabolism enhanced.

Without detailing the various procedures, one may mention as the best known, the Brand bath in typhoid fever and the chest-compress in pneumonia.

Through the cold air and cold water we effect much the same results; the time of year, the facilities of the environment and the reaction of the patients determine an indication for one or the other.

DRUGS. Drug administration, like the other measures, is aimed not at the pyrexia but at the toxemia, and that the fever is influenced is due to a relief of the toxemia or the conditions determined by it.

Cathartics occupy an important position among the drugs, because they prevent a stagnation within the bowel and the consequent absorption of putrefactive products.

The toxins of disease impinge upon the vital nervous centres and upon none more certainly than upon the vasomotor centre. Our great dread in the severe intoxication, such as typhoid fever, pneumonia, diphtheria, scarlet fever, and sepsis is a circulatory failure. The term "circulatory" is used advisedly, because upon this we can all agree, but when we try to fix this failure in the heart or in the vasomotor apparatus an abundant opportunity for difference of opinion arises.

My own belief is that the careful studies of this question show that in the large majority of cases it is the vasomotor mechanism that is at fault. For this reason my preference is for drugs that act either on the vasomotor centre or on the vessels. My own choice at the present time is for caffeine and I think it should be given in sufficient dosage and so administered as to guarantee its arrival at the goal desired. I give it in the form of one of the soluble double salts, that of caffeine and sodium benzoate or caffeine and sodium salicylate, in doses of five grains every four hours, and such studies as I have made upon its effects on blood pressure show that its effects do not last even throughout this period. Next to caffeine, I use a 10 per cent. or 20 per cent. solution of camphor in olive oil and use more than the usual dose, giving at least five grains every four hours, hypodermically, often alternating with the caffeine, thus giving a dose every two hours. Personally I have less faith in strychnine.

That we can exclude the heart in all cases I do not believe and so, if the vasomotor stimulants are not efficacious, one uses digitalis in doses of one-half an ounce of the infusion three or four times a day and appreciating that it will not become operative in less than twenty-four hours, may use as an initial dose one-half milligram of strophanthin intramuscularly.

No mention has been made so far of the antipyretics. In the early stage with bounding pulse, aconite may afford some relief by slowing the heart through the vagus, the coal tars may be used with relief of headache and other pains, but here again the fall of temperature is incidental. These drugs are depressants and should never be used where the circulation is impaired.

HYPERPYREXIA. As has been said, fever may be looked upon as of purposeful intent, as a conservative effort on the part of the organism to accomplish something useful to itself. If this be so, measures directed at the fever as such are misdirected if not pernicious, and it will be noted that the treatment of fever outlined in this paper has been directed at the toxemia accompanying the febrile movement rather than at the latter; but as was said in the beginning, any symptoms primarily useful may in the end become harmful; one may say that Nature has overshot the mark. Excessive temperatures fall into this category as well as prolonged sustained temperatures.

Hyperpyrexia threatens cell function and cell integrity as increased proteid destruction shows. We see its effects best in insolation and in certain rheumatic fevers. In these cases reduction of heat is life saving.

We have no better method than the direct application of cold in the shape of cold baths or ice rubbed upon the surface of the body. The patient may be put into a bath of 90° F. and the water cooled down to 70° F. to 75° F. The body is kept immersed until the body temperature falls below the danger point, but it is wise to remove the patient when it falls to 102° F., as collapse may ensue on efforts to reduce it to normal. If such occurs, stimulants and heat are indicated, as in collapse from any other cause.

Antipyretics of the coal-tar group are not comparable in efficienye or safety to cold water, but may be used where it is impossible to use the latter.

No attempt has been made in this paper to go into details; only generalizations have been laid down with special emphasis given to those branches of therapy commonly neglected, and for this reason serum therapy, which is specific for individual disease has been omitted.

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# CYSTS OF THE SPLEEN.

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The following case occurred in the Pennsylvania Hospital, upon the service of Dr. John H. Gibbon, during my term of service there, and on account of the rareness of the condition, is though of sufficient interest to report.

The patient, B. G., a female, aged twenty-five years, first noticed seven years ago, a slight swelling in the left side of abdomen and under the ribs in the splenic area. Since then this mass has gradually enlarged down, into, and across the abdomen. During the last year the growth was much more rapid, so that the tumor reached across the abdomen to a line drawn upward from the right iliac spine. Patient did not remember ever having been hit or struck in the region of the spleen. She complained of soreness over the mass, with at times slight nausea, but no vomiting, which was attributed to the mass. Her general health remained about the same as previous to the discovery of the tumor, but in the last year on account of the more rapid increase in growth, she though she had grown weaker. Her appetite was good, bowels constipated. She menstruated first at thirteen. Since then it has always occurred regularly with some pain the first day.

Her past medical history, family, and social history had no bearing upon the present condition.

The physical examination showed the patient to be a rather thin, somewhat anemic looking young Irish woman. Her complexion was pasty. Her teeth were in splendid condition. The lungs were normal. The cardiac dulness extended from the first interspace above, to the right border of the sternum on the right, and on the left, to the fourth rib directly below the nipple. The sounds were regular and with a good muscle tone, except that at the apex a soft mitral systolic murmur was heard. The abdomen showed the presence of a large tumor. This was largest and most prominent in the epigastrium. It was hard and in the upper part there was a distinct wave of fluctuation. This tumor extended above from the beginning of cardiac dulness, down the midaxillary line to within two inches of the anterior superior spine, then out one and one-